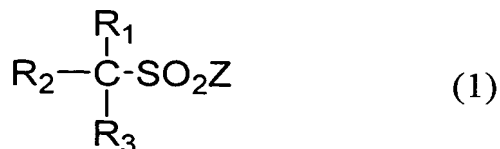


CLAIMS

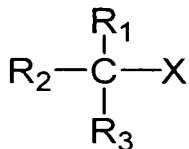
1. A method for producing a fluorine-containing halide, comprising reacting a fluorine-containing sulfonyl halide with a metal halide in the presence or absence of a solvent, the fluorine-containing sulfonyl halide being represented by general formula (1):



wherein  $\text{R}^1$ ,  $\text{R}^2$  and  $\text{R}^3$  are the same or different, each representing a halogen atom, a hydrogen atom or a monovalent hydrocarbon group which may contain one or more atoms of one or more kinds selected from fluorine, oxygen, nitrogen and sulfur atoms; at least one of  $\text{R}^1$ ,  $\text{R}^2$  and  $\text{R}^3$  is a halogen atom; Z is Cl or F; provided that when none of  $\text{R}^1$ ,  $\text{R}^2$  and  $\text{R}^3$  is a fluorine atom, at least one of  $\text{R}^1$ ,  $\text{R}^2$  and  $\text{R}^3$  is a monovalent fluorine-containing hydrocarbon group, and when Z is F,  $\text{R}_1$  and  $\text{R}_3$  are both fluorine atoms and  $\text{R}_2$  is a  $\text{CF}_2=\text{CFOCF}_2-$  group;

the metal halide being represented by general formula  $\text{M}^1\text{X}$ , wherein  $\text{M}^1$  is Ma or  $(\text{Mb})_{1/2}$ , Ma being an alkali metal, Mb being an alkaline earth metal, and X being Br or I;

the fluorine-containing halide being represented by the general formula shown below:



wherein  $\text{R}_1$ ,  $\text{R}_2$ ,  $\text{R}_3$  and X are the same as above.

2. The method for producing a fluorine-containing halide according to claim 1, wherein the fluorine-containing sulfonyl halide represented by general formula (1) is a compound represented by general formula (1a):



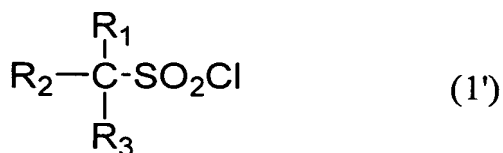
wherein  $\text{R}^4$  is a halogen atom, a hydrogen atom or a monovalent hydrocarbon group which may contain one or more atoms of one or more kinds selected from fluorine, oxygen, nitrogen and sulfur atoms.

3. The method for producing a fluorine-containing halide according to claim 1, wherein the fluorine-containing sulfonyl halide represented by general formula (1) is a compound represented by general formula  $\text{Y}(\text{CF}_2)_n\text{-SO}_2\text{Cl}$  wherein Y is a halogen atom,  $\text{-SO}_2\text{F}$  or  $\text{-CCl}_3$ , and n is an integer from 1 to 9; a compound represented by general formula  $\text{CF}_2=\text{CF}(\text{CF}_2)_e(\text{OCF}_2\text{CF}(\text{CF}_3))_g\text{O}(\text{CF}_2)_h\text{-SO}_2\text{Cl}$  wherein e is an integer from 0 to 2, g is an integer from 0 to 3, and h is an integer from 1 to 6; or a compound represented by general formula  $\text{CF}_2=\text{CFOCF}_2\text{CF}_2\text{SO}_2\text{F}$ .

4. The method according to claim 1, wherein the metal halide represented by chemical formula  $\text{M}^1\text{X}$  is an alkali metal bromide or alkali metal iodide.

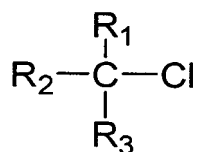
5. The method according to claim 1, wherein the reaction is carried out in a polar solvent.

6. A method for producing a fluorine-containing chloride, comprising reacting a fluorine-containing sulfonyl chloride in the presence or absence of a solvent with at least one member selected from the group consisting of metals belonging to periods 4 to 7 of groups 3 to 16 in the periodic table and compounds containing any of such metals, the fluorine-containing sulfonyl chloride being represented by general formula (1'):



wherein  $\text{R}^1$ ,  $\text{R}^2$  and  $\text{R}^3$  are the same or different, each representing a halogen atom, a hydrogen atom or a monovalent hydrocarbon group which may contain one or more atoms of one or more kinds selected from fluorine, oxygen, nitrogen and sulfur atoms; and at least one of  $\text{R}^1$ ,  $\text{R}^2$  and  $\text{R}^3$  is a halogen atom; provided that when none of  $\text{R}^1$ ,  $\text{R}^2$  and  $\text{R}^3$  is a fluorine atom, at least one of  $\text{R}^1$ ,  $\text{R}^2$  and  $\text{R}^3$  is a monovalent fluorine-containing hydrocarbon group;

the fluorine-containing chloride being represented by the general formula shown below:



wherein  $\text{R}^1$ ,  $\text{R}^2$  and  $\text{R}^3$  are the same as above.

7. The method for producing a fluorine-containing chloride according to claim 6, wherein the fluorine-containing sulfonyl chloride represented by general formula (1') is a compound represented by general formula (1a):



wherein  $\text{R}^4$  is a halogen atom, a hydrogen atom or a monovalent hydrocarbon group which may contain one or more atoms of one or more kinds selected from fluorine, oxygen, nitrogen and sulfur atoms.

8. The method for producing a fluorine-containing chloride according to claim 6, wherein the fluorine-containing sulfonyl chloride represented by general formula (1') is a compound represented by general formula  $\text{Y}(\text{CF}_2)_n-\text{SO}_2\text{Cl}$  wherein Y is a halogen atom,  $-\text{SO}_2\text{F}$  or  $-\text{CCl}_3$ , and n is an integer from 1 to 9; or a compound represented by general formula

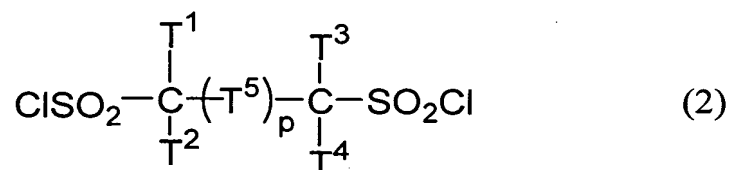
$\text{CF}_2=\text{CF}(\text{CF}_2)_e(\text{OCF}_2\text{CF}(\text{CF}_3))_g\text{O}(\text{CF}_2)_h-\text{SO}_2\text{Cl}$  wherein  $e$  is an integer from 0 to 2,  $g$  is an integer from 0 to 3, and  $h$  is an integer from 1 to 6.

5                    9. The method according to claim 6, wherein the metals belonging to periods 4 to 7 of groups 3 to 16 in the periodic table are Cu, Pt, Pd, Ni, Zn and Fe, and the compounds containing any of metals belonging to periods 4 to 7 of groups 3 to 16 in the periodic table are compounds containing Cu, Fe, Ni, Co, Pd,  
10 Ti or Pb as a metal component.

10. The method according to claim 6, wherein the reaction is carried out in a polar solvent.

15                    11. A method for producing a fluorine-containing halide, comprising reacting a fluorine-containing disulfonyl chloride with a metal halide in the presence or absence of a solvent,

the fluorine-containing disulfonyl chloride being  
20 represented by general formula (2):

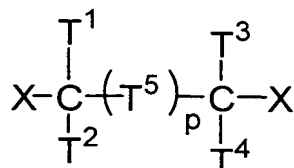


wherein  $\text{T}^1$ ,  $\text{T}^2$ ,  $\text{T}^3$  and  $\text{T}^4$  are the same or different, each representing a halogen atom, a hydrogen atom or a monovalent hydrocarbon group which may contain one or more atoms of one or  
25 more kinds selected from fluorine, oxygen, nitrogen and sulfur atoms; at least one of  $\text{T}^1$ ,  $\text{T}^2$ ,  $\text{T}^3$  and  $\text{T}^4$  is a halogen atom;  $\text{T}^5$  is a bivalent hydrocarbon group which may contain one or more atoms of one or more kinds selected from fluorine, oxygen, nitrogen and sulfur atoms; and  $p$  is 0 or 1; provided that at least one of  $\text{T}^1$   
30 and  $\text{T}^2$  is a monovalent fluorine-containing hydrocarbon group when neither  $\text{T}^1$  nor  $\text{T}^2$  is a fluorine atom, and at least one of  $\text{T}^3$  and  $\text{T}^4$  is a monovalent fluorine-containing hydrocarbon group when

neither  $T^3$  nor  $T^4$  is a fluorine atom;

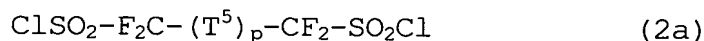
the metal halide being represented by general formula  $M^1X$ , wherein  $M^1$  is Ma or  $(Mb)_{1/2}$ , Ma being an alkali metal, Mb being an alkaline earth metal, and X being Br or I;

5 the fluorine-containing halide being represented by general formula shown below:



wherein  $T^1$ ,  $T^2$ ,  $T^3$ ,  $T^4$ ,  $T^5$ , X and p are the same as above.

10 12. The method for producing a fluorine-containing halide according to claim 11, wherein the fluorine-containing disulfonyl chloride represented by general formula (2) is a compound represented by general formula (2a):



15 wherein  $T^5$  is a bivalent hydrocarbon group which may contain one or more atoms of one or more kinds selected from fluorine, oxygen, nitrogen and sulfur atoms; and p is 0 or 1.

20 13. The method for producing a fluorine-containing halide according to claim 11, wherein the fluorine-containing disulfonyl chloride represented by general formula (2) is a compound represented by general formula  $ClSO_2(CF_2)_pSO_2Cl$ , wherein p is an integer from 2 to 9.

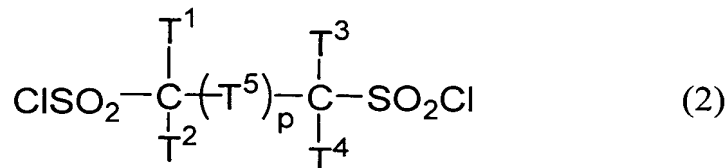
25 14. The method according to claim 11, wherein the metal halide represented by chemical formula  $M^1X$  is an alkali metal bromide or alkali metal iodide.

30 15. The method according to claim 11, wherein the reaction is carried out in a polar solvent.

16. A method for producing a fluorine-containing

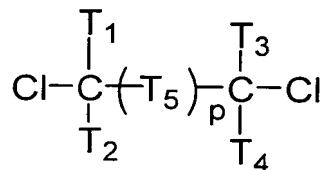
chloride, comprising reacting a fluorine-containing disulfonyl chloride in the presence or absence of a solvent with at least one member selected from the group consisting of metals belonging to periods 4 to 7 of groups 3 to 16 in the periodic table and compounds containing any of such metals,

the fluorine-containing disulfonyl chloride being represented by general formula (2):



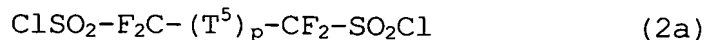
wherein  $\text{T}^1$ ,  $\text{T}^2$ ,  $\text{T}^3$  and  $\text{T}^4$  are the same or different, each representing a halogen atom, a hydrogen atom or a monovalent hydrocarbon group which may contain one or more atoms of one or more kinds selected from fluorine, oxygen, nitrogen and sulfur atoms; at least one of  $\text{T}^1$ ,  $\text{T}^2$ ,  $\text{T}^3$  and  $\text{T}^4$  is a halogen atom;  $\text{T}^5$  is a bivalent hydrocarbon group which may contain one or more atoms of one or more kinds selected from fluorine, oxygen, nitrogen and sulfur atoms; and  $p$  is 0 or 1; provided that at least one of  $\text{T}^1$  and  $\text{T}^2$  is a monovalent fluorine-containing hydrocarbon group when neither  $\text{T}^1$  nor  $\text{T}^2$  is a fluorine atom, and at least one of  $\text{T}^3$  and  $\text{T}^4$  is a monovalent fluorine-containing hydrocarbon group when neither  $\text{T}^3$  nor  $\text{T}^4$  is a fluorine atom;

the fluorine-containing chloride being represented by general formula shown below:



wherein  $\text{T}^1$ ,  $\text{T}^2$ ,  $\text{T}^3$ ,  $\text{T}^4$ ,  $\text{T}^5$  and  $p$  are the same as above.

17. The method for producing a fluorine-containing chloride according to claim 16, wherein the fluorine-containing disulfonyl chloride represented by general formula (2) is a compound represented by general formula (2a):



wherein  $\text{T}^5$  is a bivalent hydrocarbon group which may contain one or more atoms of one or more kinds selected from fluorine, oxygen, nitrogen and sulfur atoms; and  $p$  is 0 or 1.

5

18. The method for producing a fluorine-containing chloride according to claim 16, wherein the fluorine-containing disulfonyl chloride represented by general formula (2) is a compound represented by general formula  $\text{ClSO}_2(\text{CF}_2)_p\text{SO}_2\text{Cl}$ , wherein  $p$  is an integer from 2 to 9.

10

19. The method according to claim 16, wherein the metals belonging to periods 4 to 7 of groups 3 to 16 in the periodic table are Cu, Pt, Pd, Ni, Zn and Fe, and the compounds containing any of metals belonging to periods 4 to 7 of groups 3 to 16 in the periodic table are compounds containing Cu, Fe, Ni, Co, Pd, Ti or Pb as a metal component.

15

20. The method according to claim 16, wherein the reaction is carried out in a polar solvent.

20